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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,933	02/22/2002	Jianzhong Zhang	59864.00665	6502
32294 7590 12/19/2008 SQUIRE, SANDERS & DEMPSEY L.L.P. 8000 TOWERS CRESCENT DRIVE 14TH FLOOR VIENNA, VA 22182-6212			EXAMINER CORRIELUS, JEAN B	
			ART UNIT 2611	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/080,933	Applicant(s) ZHANG ET AL.	
	Examiner Jean B. Corrielus	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 December 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21,23-28,30-33,36-38,40-42,46 and 47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 221,23-28,30-33,36-38 and 40-42, 46-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/3/08 has been entered.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a) because they fail to show a signal input from the signal estimator to the "joint optimizer", shown in fig. 3, as described in the specification page 12, lines 7-8 and fig. 23. In addition, fig. 3 is the expanded view of elements 74 and 56/58 shown in fig. 2. Fig. 2 only shows signals 82 and 84 feeding components 56/58 while fig. 3 shows signals 53, 82 and 84 feeding circuit 56/58. In other words, base fig. 2 does not show any signal "53" being provided to circuit 56/58. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be

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canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency.

Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. Applicant's response has overcome the objection to the disclosure.

Claim Objections

4. Applicant's response has overcome the objection to claims 21, 23-28, 30-33, 36-38, 40-47. However, claims 38, and 40-42 are further objected to as follow. Claim 38 recites the feedback filtering means for filtering optimized values and summed output from the optimizing means and the summing means. However, it is noted per the disclosure, the feedback filtering means does not filter the optimized values, rather it uses such values to set the tap coefficients. In addition, the feedback filter is not disclosed to filter the summed output from the summing means it receives rather the maximum likelihood values from the MLSE device. Note that if correction is not made in the next office action, a potential 112 first paragraph rejection may exist.

Claim Rejections - 35 USC § 112

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5. Applicant's response has overcome the 112 first paragraph rejection of claims 38 and 40-42

6. Applicant's response has overcome the 112 first paragraph rejection of claims 21, 23-28, 30, 31, 38 and 43-45.

Examiner's comment

7. Note that claims 38, 40-42 recite means plus function limitations and effectively invoke 112 sixth paragraph. The claims are treated as such.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 21, 23-26, 28, 30, 38, 40-42 and 46-47 are rejected under 35 U.S.C. 102(e) as being anticipated by Zangi et al US patent No. 6,775,322 et al.

As per claim 21, Zangi et al teaches a receiving station (figs. 1 and 3) comprising a signal filter see col. 3, lines 47-50 inherently in communication with a signal receiving antenna (note fig. 1 is described by Zangi as see col. 3, lines 29-30, as a mobile station therefore it has to include an antenna); a signal estimator 122 in communication with the signal filter see col. 4, lines 57-60; circuit (124) corresponding to the claimed (signal optimizer) configured to generate tap coefficients (optimized values) for the signal from

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the signal filter ; a prefilter 102 configured to filter the signal from the signal filter using the generated tap coefficients (optimized values) for the signal see col. 4, lines 59-61; circuits (104, 106 and 108) considered as the claimed “decision feedback sequence estimator” to receive the coefficients (optimized values) note input to filter 104, circuit blocks (104, 106 and 108) “decision feedback sequence estimator” comprising a summing element 106, a feedback filter 104 and a maximum likelihood sequence estimator 108, see col. 11, lines 9-12, as shown in fig. 3, Zangi teaches that the summing element 106, the feedback filter 104 and the MLSE 108 are operatively connected to one another and further connected to prefilter 102. Note that the interconnection of the prefilter 102r, the feedback filter 104, the MLSE 108 and the summing element 106 cooperatively operate to permit inherently concurrent interference and prefilter operation to be performed because there is no structural difference between the Zangi’s disclosed features of prefilter, the feedback filter, the MLSE and the summing element and the applicant claimed features of “prefilter, the feedback filter, the MLSE and the summing element”.

As per claim 23, Zangi et al teaches that the output of the decision device (MLSE) 108 is configured to transmit generated maximum likelihood values through an output to the feedback filter 104 and the input of the decision device (MLSE) 108 is configured to receive summed values from the summing element 106.

As per claim 24, Zangi et al teaches the feedback filter 104 comprises a first input in communication with circuit 124 (signal optimizer) and configure to receive the

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optimized values from the circuit 124 (signal optimizer) and a second input configured to receive the generated maximum likelihood values from the MLSE 108.

As per claim 25, Zangi et al further teaches the summing element 106 receives inputs from prefilter 102 and the feedback filter 104 and sends a summed output to the MLSE device 108.

As per claim 26, the signal filter see col. 3, lines 47-50 is located in the forward path of the receiving station hence it has to be a feedforward filter.

As per claim 28, Zangi further teaches that the feedback filter 104 receives optimized signals from the signal optimizer 124 that are used to define filter characteristics of the feedback filter 104 see col. 4, lines 57-60.

As per claim 30, the signal filter see col. 3, lines 47-50 and the signal estimator 122 is placed in the received chain of the receiving station see fig. 1.

As per claim 38, Zangi et al teaches a receiving station (fig. 1 and 3) comprising see col. 3, lines 47-50 inherently in communication with a signal receiving antenna (note fig. 1 is described by Zangi as see col. 3, lines 29-30, as a mobile station therefore it has to include an antenna); a signal estimating means 122 for estimating channel operations of the signal from the signal filtering means; means 124 corresponding to the claimed signal optimizing means in communication with the signal filtering means for generating coefficients (optimized values); prefiltering means 102 for filtering the signal from the signal filtering means using the generated coefficients (optimized values) means (104, 106 and 108) considered as the claimed "interference cancellation means" for receiving the coefficients (optimized values) to perform concurrent interference and

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prefilter operations; Zangi further teaches that means (104, 106 and 108) (interference canceling means) comprises summing means 106 for summing inputs from the prefiltering means 102; feedback filtering means 104 for receiving coefficients (optimized values) and a summed values output signal from the signal optimizing means (124) and the summing means 106, respectively; MLSE means 108 for generating maximum values from the summing means 106. Note that the interconnection of the prefiltering means 102, the feedback filtering means 104, the MLSE means 108 and the summing means 106 cooperatively operate to permit inherently concurrent interference and prefilter operation to be performed because there is no structural difference between the Zangi's claimed features of prefiltering means, the feedback filtering means, the MLSE means and the summing means and the applicant claimed features of "prefiltering means , the feedback filtering means, the MLSE means and the summing means.

As per claim 40 see claim 23.

As per claim 41 see claim 24.

As per claim 42, Zangi et al further teaches the summing element 106 receives inputs from prefilter 102 and the feedback filter 104 and sends a summed output to the MLSE device 108 and an output of the MLSE being an output from the receiving station see fig. 3.

As per claim 46 the apparatus is a mobile communication device. See col. 3, lines 29-30.

As per claim 47 the device is inherently an integrated circuit because mobile communication devices uses IC circuit.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zangi et al US patent No. 6,775,322 et al. in view of Taylor US Patent Application No. 2002/0197987.

As per claim 27, as applied to claim 25 above, Zangi et al teaches every feature of the claimed invention but does not explicitly teach the further limitation of a deinterleaver in communication with an output of the MLSE estimator and depuncture in communication with a deinterleaver and a channel decoder in communication with the deinterleaver. Taylor et al teaches a deinterleaver 58 in communication with an output of the MLSE estimator (i.e. output of demodulator/equalizer 56) and depuncture 62 in communication with a deinterleaver 58 and a channel decoder 64 in communication with the deinterleaver 58. It would have been obvious to one skill in the art to incorporate such a teaching in Zangi et al in order to recover the originally transmitted signal.

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12. Claims 31-33 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zangi et al US patent No. 6,775,322 in view of Malkemes et al US Patent Application publication S/N US2002/0106040 A1.

As per claim 31, as applied to claim 30 above, Zangi et al teaches every feature of the claimed invention but does not explicitly teach that the receiving station comprises a plurality of receive chains that corresponds to a plurality of signal receiving antennas configured to receive and transmit a plurality of signal vector to the plurality of receive chains. Malkemes et al teaches the receiving station (fig. 1) comprises a plurality of receive chains see fig. 1) that corresponds to a plurality of signal receiving antennas 102 configured to receive and transmit a plurality of signal vector to the plurality of receive chains. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Zangi et al in order to improve signal detection since the system would have been able to be configured to receive multiple copies so that existence of signal error can be easily determined.

As per claim 32, see claim 31. In addition, Zangi teaches transmitting the coefficients (optimized feed forward filter parameters and the optimized feedback filter parameters) to a decision feedback sequence estimator (104, 106 and 108), wherein the decision feedback sequence estimator (104, 106 and 108) comprises a feedback filter 104: note that the limitation “simultaneously” is interpreted as “both”. Clearly Zangi teaches that “both” interference cancellation and prefiltering operations are performed via the feedforward filter 102 and the feedback filter 104. see col. 4, lines 43-50. In addition, for the sake of argument, note that the prefiltered signal from feedforward filter

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102 is provided as input to the summer 106 at the same time as the ISI compensated signal generated by feedback filter 104 (see col. 7, lines 15-21) another indication that the prefilter and ISI compensation are performed simultaneously.

As per claim 33, Zangi et al further teaches the feedforward filter 102 filters the data vector and transmitting a feedforward output to a summing element 106; receiving an output of the summing element in a MLSE device 108 and generating an output of that is transmitted to an input of the feedback filter 104 and subsequent component and filtering the output received from the MSLE device in the feedback filter 104 and transmitting a filtered signal to the summing element 106.

As per claim 36, Zangi further teaches the received chain comprises a receiving filter see col. 3, lines 47-50 inherently in communication with a signal receiving antenna (note fig. 1 is described by Zangi as see col. 3, lines 29-30, as a mobile station therefore it has to include an antenna); a channel estimator 122 in communication with the receiving filter; the channel estimator 122 in communication with circuit 124 corresponding to the claimed signal optimizer configured to optimized feedforward and feedback filter parameters see col. 5, lines 1-27.

13. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zangi et al US patent No. 6,775,322 in view of Malkemes et al US Patent Application publication S/N US2002/0106040 A1 and further in view of Taylor US Patent Application No. 2002/0197987.

As per claim 37, as applied to claim 33 above, Zangi et al and Malkemes et al teach every feature of the claimed invention but do not explicitly teach the further limitation of a deinterleaver in communication with an output of the MLSE estimator and depuncture in communication with a deinterleaver and a channel decoder in communication with the deinterleaver. Taylor et al teaches a deinterleaver 58 in communication with an output of the MLSE estimator (i.e. output of demodulator/equalizer 56) and depuncture 62 in communication with a deinterleaver 58 and a channel decoder 64 in communication with the deinterleaver 58. It would have been obvious to one skill in the art to incorporate such a teaching in Zangi et al and Malkemes in order to recover the originally transmitted signal.

Response to Arguments

14. Applicant's arguments filed 12/3/08 have been fully considered but they are not persuasive. it is alleged that Zangi fails to teach "a decision feedback sequence estimator configured to receive the generated optimized values". Examiner disagrees. As shown in fig. 3, Zangi shows the decision feedback sequence estimator encompassed by (104, 106 and 108) configured to receive tap coefficients (optimized values) from the adaptive algorithm (optimizer) 124, in addition, note col. 4, lines 59-60. Applicant's argument that Zangi is not configured to receive the generated optimized values is not convincing since as stated above Zangi teaches that the optimized values (tap coefficient) are provided to both the feedforward and feedback filter note col. 4, lines 59-60. It is the applicant position that the office action alters the teaching of Zangi to allege that the adaptive algorithm is a separate structural element located outside

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DFE/DFSE 100 of Zangi. Applicant should note that in actual hardware implementation the **dotted lines** shown in Fig. 3 of Zangi will not exist. Therefore **dotted lines** are not in anyway an indication of any structure. Any argument that the adaptive algorithm of Zangi is within or outside the equalizer 100 does not have any merit, as there will not be any structural change in Fig. 3 of Zangi whether the dotted lines are present or removed. Examiner also notes that the circuit functionality will remain unchanged as well. Accordingly, since there is no structural difference between fig. 3 of zangi, when viewed with or without the dotted lines, and applicant claimed invention, it is the examiner's position that the prior art fig. 3 of Zangi met applicant's claimed invention, as set forth in the above rejection. In addition, any argument with respect to Taylor and Malkemes not compensating for the defficiencies noted in Zangi is moot since as noted above, Zangi is shown to teach the underlined claimed feature. Applicant further alleged that the drawing sufficiently illustrates a signal connection between the signal filter and the optimizer. However, the drawing fig. 3 does not show a signal input from the signal estimator to the joint optimizer, as noted in page 12, lines 7-8, to received values from the signal estimator.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean B. Corrielus whose telephone number is 571-272-3020. The examiner can normally be reached on Monday-Thursday from 9:30-3:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jean B Corrielus/
Primary Examiner
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